Neuro Harlow – the effect of a mother's touch on her child's developing brain

In the 1950s the American psychologist Harry Harlow famously showed that infant rhesus monkeys would rather cling to a surrogate wire mother covered in cosy cloth, than to one that provided milk. A loving touch is more important even than food, the findings seemed to show. Around the same time the British psychoanalyst John Bowlby documented how human children deprived of motherly contact often go on to develop psychological problems. Now this line of research has entered the neuroscience era with a study in *Cerebral Cortex* claiming that children with more tactile mothers tend to have more developed social brains.

Jens Brauer and his colleagues videoed 43 mum–child dyads as they sat together on a couch and played with a Playmobil farm.

In *Cerebral Cortex*

The mothers knew they were being filmed but didn't know the aims of the study. There were 24 boys and 19 girls and their average age was 5.5 years. Coders then watched the videos and counted every instance that the mothers touched their child or vice versa. Finally and within the next two weeks, the researchers scanned each child's brain while they lay as still as possible looking at a lava lamp screensaver (a brain imaging technique known as a resting-state scan).

The researchers were particularly interested in levels of resting activity in the children's brains in a network of areas known to be involved in functions such as empathy and thinking about other people's mental states – sometimes referred to as the 'social brain'. They found that the children who were touched more by their mother in the 10-minute play session tended to have more resting activity in the social brain, especially the right superior temporal sulcus (STS). Children who received more touch also showed more resting connectivity between different functional nodes within their social brain, such as between the STS and the inferior frontal gyrus and the left insula.

Children touched more by their mother also usually touched their mothers more, but the links between mothers' touch and the children's neural activity were still significant after factoring this out.

Previous research has found that greater resting activity in a person's social brain is linked with their social and emotional abilities, such as being able to take other people's perspective. Based on this, the researchers said: '…one may speculate that children with more touch more readily engage the mentalizing component of the "social brain" and that, perhaps, their interest in others' mental states is greater than that of children with less touch.'

The research has some serious limitations, most obviously – and as the researchers acknowledged – that the results are correlational, so it's possible unknown factors are driving differences in amounts of motherly touch and in the children's brain development. For example, perhaps some mothers are more engaged on many levels, including talking to their children more. Such mothers might be more tactile, but it could be, for instance, the way they talk to their children that is responsible for the brain differences. Another major factor, not mentioned by the researchers, is potential genetic effects. The same genes driving tactile behaviour in mothers might be passed down to their children influencing their brain development. It's also worth noting that it remains to be seen whether similar results would be found for levels of touch from a father or other caregiver.

These issues aside, Brauer and his colleagues ask us to consider their results in light of animal research that is able to experimentally control how much motherly touch different individual animals are exposed to. This has shown that greater maternal touch is associated with important brain changes in rats, for example in the way their brains respond to stress, and that rats raised with more touch go on to be more tactile towards their own offspring. 'On the backdrop of this work then, it is not unreasonable to suspect a potential causal role of touch for human development,' the researchers said. CJ

More evidence that literary, but not pop, fiction boosts readers' emotional skills

In *Psychology of Aesthetics, Creativity and the Arts*

Three years ago, a pair of psychologists at the New School for Social Research in New York attracted worldwide interest and controversy when they reported in the prestigious journal *Science* that reading just a few pages of literary fiction boosted research participants' recognition of other people's emotions, but that reading pop fiction (also known as genre fiction) did not. Now the same researchers have returned with a new paper in *Psychology of Aesthetics, Creativity and the Arts* that used a different approach to arrive at the same conclusion – again, reading literary fiction, but not genre fiction, appears to be associated with superior emotion-recognition skills.

The research from 2013 involved online participants reading a few pages of literary fiction (including excerpts from novels by Don DeLillo, Lydia Davis or Louise Erdrich) or pop fiction (including excerpts from Danielle Steele, Rosamunde Pilcher and Gillian Flynn) and then attempting to discern people's emotions from looking at their eyes.

One of that study's critics was Mark Liberman. On his influential Language Log blog he expressed surprise that the study had even been accepted for publication – after all, he argued, the researchers had hand-picked just a few seemingly arbitrary examples of literary and genre fiction. It was, he said, a 'breath-taking overgeneralisation' to extrapolate from the effects of these passages to say anything about lit fiction or genre fiction as a whole.

For the new research, David Kidd and Emanuele Castano tested over 2000 more people on the same 'Reading the Mind in the Eyes Test' they used previously (the test involves looking at just the eye regions of actors' faces and selecting from four complex emotion words which one best describes each actor's felt emotion). Some of the participants were recruited via a link in a *New York Times* article about the association between reading fiction and interpersonal sensitivity, others were recruited via Amazon's Mechanical Turk survey website.

As well as completing the emotion-recognition test, the participants were also shown a list of 130 names and asked to say which, if any, were the names of established authors. Sixty-five of the listed names were authors, some of them of pop fiction (such as Dick Francis, Tom Clancy and Stephen King), others of literary fiction (such as Salman Rushdie, George Orwell and Kazuo Ishiguro). Greater recognition of literary authors was interpreted as an indication that a participant had read more literary fiction.

There was a clear pattern in the findings – the more literary fiction authors that participants recognised, the better they tended to perform on the emotion-recognition test, and this association held even after statistically accounting for the influence of other factors that might be connected to both emotion skills and reading more literary fiction, such as past educational attainment, gender and age.

A second study involving over 300 more participants recruited online was similar but also included a measure of participants' self-reported empathy levels – this was to check that it's not simply that people with more empathy are more attracted to literary fiction and also tend to do better at the emotion-recognition test. Again, participants who recognised more literary fiction authors also tended to perform better on the emotion test, and this association remained even after controlling for the influence of differences in participants' empathy levels.

Kidd and Castano said the consistency of their findings across three samples showed that the patterns they found are 'robust'. They believe the apparent link between reading more literary fiction and better emotion-recognition skills emerges because 'the implied (rather than explicit) sociocognitive complexity, or roundness of characters, in literary fiction prompts readers to make, adjust, and consider multiple interpretations of characters' mental states'. However, they acknowledged that 'no direct evidence speaks to the precise mechanisms' by which literary fiction exerts its postulated benefits.

Perhaps mindful of some of the criticism levelled at their earlier research, Kidd and Castano also point out that their findings should not be taken as evidence of 'the superiority of literary fiction'. Rather, they say, all types of fiction are likely to have an effect on people's emotional understanding, but in different ways. They speculate that reading more pop fiction that's filled with stereotypical characters might encourage the 'other strategy of social perception', which is to understand people 'in terms of their social identities and roles' – an approach likely to be favoured in less individualistic cultures.

Critics of the new research might feel that Kidd and Castano are again extrapolating rather far from some fairly vague results – for example, it's worth noting that the meaning of performance differences on the Reading the Mind in the Eyes Test is an area of contention in psychology, where it's been shown that performance is related to verbal IQ, not just emotional perspective taking. Others perhaps will continue to feel uncomfortable about the very enterprise of attempting to distil the benefits of reading fiction into a number on a psychometric test. **CJ**

The secret to strong friendships? Interconnected memories

In *Journal of Personal and Social Relationships*

No man is an island: we act together, think together and even remember together. Elderly couples have interconnected memory systems, working together to deftly remember their shared past. New research in the *Journal of Personal and Social Relationships* shows that platonic friends see themselves similarly. In a sample of 216 students and online recruits, Nicole Iannone and colleagues found high agreement with items such as 'My best friend and I can remind each other of things we know', part of a scale measuring 'transactive memory systems' – shared systems of recording, storing and recalling information. Ratings were even higher when participants were referring to friendships that were longer, more trusting or of a higher quality overall.

Gender had no effect on degree of interconnection, but seemed to shape the kind of interconnection. In a second study with 340 participants, same-sex friendships were more likely to have overlap in similar memory areas, such as both knowing a lot about movies, whereas mixed-sex friends had distinctive areas of expertise – suggesting a good team-up for a trivia night. The authors note that in their sample, memory interdependence was the single best predictor of friendship quality, more even than relationship length or a measure of trust, raising the idea that putting faith in someone else to preserve your past is an important facet of long-term intimacy. **AF**

DIGEST DIGESTED

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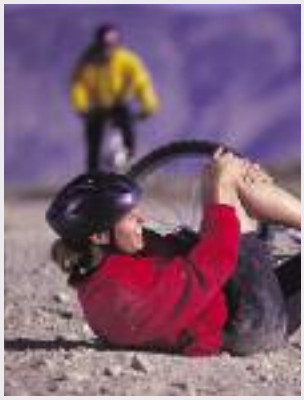
We tend to make rapid assumptions about strangers based on their gender and ethnicity, and also based on their facial expression. However, when these signals clash, a new study found that facial expressions come out on top, at least in the case of smiling. 'Smiling levels the playing field,' the researchers said. *Motivation and Emotion*

It is possible to find happiness again after major depression, according to a survey of 20,000 Canadians, 2528 of whom had previously been diagnosed with major depression. Two fifths of this subgroup were found to be fully recovered, and among the factors associated with recovery, having quality relationships and good physical health were especially important. *Psychiatry Research*

Students may learn better from attractive lecturers, according to a study that involved students listening to a physics lecture while looking at a photograph, ostensibly of the lecturer, which depicted either an unusually attractive or unattractive person. In a subsequent quiz, the students who thought their lecturer was attractive performed better. *Journal of General Psychology*



Watching someone suffer extreme pain seems to have a lasting effect on the brain. Researchers used MEG to record soldiers' brain activity while they looked at images depicting a painful situation, or a near miss (e.g. an axe nearly hitting a foot). Participants who had previously witnessed the death or suffering of a comrade, but not controls, showed similar pain-related brain activity when looking at both types of image. *Cognitive, Affective, & Behavioural Neuroscience*

After we've been rejected, our brains perform a subtle trick to help us make more friends. Participants were snubbed in an online ball game and afterwards they were more likely to think that faces were looking at them – what researchers called a widening of 'cone of gaze'. Sensing mutual gaze in this way is known to be an important starting point for social contact. *Quarterly Journal of Experimental Psychology*

Despite the stereotypes found in popular culture (such as *Star Trek*'s Mr Spock) analytical people may be better at understanding other people's emotions. Managers on a training programme answered analytical questions and then took part in a mock interview. Those who did better on the analytical questions were more accurate at rating their interview partner's feelings. *Journal of Personality and Social Psychology*

By age 3, kids know when you owe them one

In *Developmental Psychology*

If we're being honest, most of us would admit that we keep an ongoing mental record of who has done what for whom among our relationships. It sounds a little churlish but this note-keeping is a basic aspect of social functioning that means we can avoid being taken advantage of by free riders, and also helps us decide who to turn to when we're in need.

When does this sense of social fairness emerge? Developmental psychologists have previously demonstrated that pre-schoolers have a keen sense of reciprocity – for example, they will share more toys with other kids who have previously shared more with them. A new study in *Developmental Psychology* has flipped this around, showing that already by age three years, children also recognise when others are indebted to them.

Markus Paulus at Ludwig-Maximilians-University of Munich recruited around 40 three-year-olds and five-year-olds to play a sharing game with two toy animals. Over three rounds, the children, who were tested alone, had to choose how many stickers to share with each animal. Crucially, Paulus fixed things so that the kids' choice for one animal was to share either two or three out of six stickers each round, whereas their choice for the other disadvantaged animal was to share either one or no stickers out of two. This obviously ensured that over the three rounds, the child had shared more stickers with one of the animals than the other.

Next, and this was important to rule out other explanations for the results, Paulus showed the children that the animals also had their own sticker collection. In fact the quantity of their own stickers meant that combined with the ones from the child, each animal now had exactly the same number of stickers. This ensured that the children's later behaviour wasn't influenced by perceiving one animal to be wealthier than the other in terms of sticker ownership.

The most important stage came next. Over several rounds the same two toy animals were shown in possession of various enticing toys, such as balloons, marbles and colouring pictures (each animal always had the same number). Each round, the children were given the chance to ask one animal if they could share their toys, and the interesting test was which animal they would approach.

The children showed a consistent tendency to ask for toys from the animal to whom they had earlier given more stickers, and this was just as true for the three-year-olds as it was for the five-year-olds.

'The current study's major contribution is its demonstration that preschool children are able to register and remember to whom they had allocated more resources, and that they strategically asked this recipient in a subsequent phase to share resources with them,' Paulus said.

Further evidence of the sophistication of the children's thinking came from another similar experiment in which the animals left the room when the children made their sticker